

**NOTE TO PTO PERSONNEL:**  
**THIS PATENT APPLICATION IS BEING**  
**FILED WITH SMALL ENTITY STATUS**

TURN SIGNAL LIGHT USING LIGHT-EMITTING DIODES  
AS LIGHT SOURCES

FIELD OF THE INVENTION

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The present invention relates to a turn signal light, and more particularly to a turn signal light that uses light-emitting diodes as light sources.

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BACKGROUND OF THE INVENTION

A turn signal light is provided to warn other drivers or pedestrians of a car going to turn or change its moving direction. Generally, the turn signal light for  
15 a vehicle uses a tungsten lamp as a light source. However, the conventional tungsten lamp tends to burn out due to high temperature or break due to shocks. And, light beams emitted from the tungsten lamp are too sharp. With advancements in the scientific field,  
20 light-emitting diode (LED) has been developed. An LED has the advantages of providing a radiated light source and moderate beams, and not tending to break due to shocks, and is therefore gradually adopted by consumers as a light source of the turn signal light.  
25 Nevertheless, light beams emitted from the LED are

projected in the manner of bunched beams and thus provide a relatively small halo effect surrounding the turn signal light, which is not easily perceived by a driver of a coming car and therefore not safe for use.

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#### SUMMARY OF THE INVENTION

A primary object of the present invention is to provide an improved turn signal light using light-emitting diodes as light sources, in which part of direct light beams emitted from light-emitting diodes are reflected and refracted to produce even better illuminating and warning effect.

15 To achieve the above and other objects, the turn signal light using light-emitting diodes as light sources according to the present invention mainly includes a backboard; a circuit board located in front of the backboard and provided at a front side with a plurality  
20 of light-emitting diodes to serve as light sources of the turn signal light; an intermediate board located in front of the circuit board and provided with a plurality of reflecting openings having reducing cross section to each enclose one light-emitting diode; and  
25 a lens located in front of the intermediate board and

provided at an inner side with a plurality of raised areas. Part of initially direct light beams emitted from the light-emitting diodes are reflected at the reducing openings and refracted by the raised areas  
5 of the lens to provide diffused light and enhanced illuminating effect.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein

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Fig. 1 is an exploded perspective view of a turn signal light using light-emitting diodes as light sources according to an embodiment of the present invention;

20 Fig. 2 is an assembled top perspective view of Fig. 1;

Fig. 3 is a bottom perspective view of a lens of the turn signal light of Fig. 1;

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Fig. 4 is an assembled sectional view of Fig. 2;

Fig. 5 is a sectional view showing the illuminating effect of the present invention;

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Fig. 6 shows the use of the present invention on a motorcycle;

Fig. 7 shows the use of the present invention on a car;

10 and

Fig. 8 is a bottom perspective view of an intermediate board in the turn signal light of the present invention.

15 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to Fig. 1 that is an exploded perspective view of a turn signal light 1 using light-emitting diodes as light sources according to the present invention.

20 As shown, the turn signal light 1 mainly includes from bottom to top a backboard 10, a circuit board 11, an intermediate board 12, and a lens 13. Fig. 2 is an assembled perspective view of Fig. 1.

25 The backboard 10 is a member having a flat rear side

adapted for fitly attaching to any desired position  
on a vehicle, such as a motorcycle as shown in Fig.  
6, or a car as shown in Fig. 7. Mounting holes 101 are  
provided on the backboard 10 at predetermined  
5 positions.

The circuit board 11 is provided on front and rear sides  
with a plurality of circuit elements (not shown), and  
at the front side with a plurality of light-emitting  
10 diodes 111.

The intermediate board 12 is located between the circuit  
board 11 and the lens 13, and provided with a plurality  
of separated openings 121 corresponding to the  
15 light-emitting diodes 111 on the circuit board 11. Each  
of the openings 121 has a reducing cross section from  
outer to inner end thereof. Please refer to Fig. 8.  
An inner portion of each opening 121 located behind  
the intermediate board 12 forms a rearward protruded  
20 protective wall 123 to protect a corresponding  
light-emitting diode 111. Spaces on a rear side of the  
intermediate board 12 between the protective walls 123  
may still be fully utilized to accommodate electronic  
elements.

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In the illustrated embodiment, each of the openings 121 has a hexagonal cross section. Through holes 122 are provided on the intermediate board 12 corresponding to the mounting holes 101 on the backboard 10. When  
5 the intermediate board 12 is connected to the front side of the backboard 10 to locate in front of the circuit board 11, the light-emitting diodes 111 are separately enclosed in inner surfaces of the openings 121 and the protective walls 123. The intermediate board 12 may  
10 have a outer surface made of a reflecting material to enables the turn signal light of the present invention to have an enhanced illuminating effect.

Please refer to Figs. 2 and 3. The lens 13 is provided  
15 at an inner side with a plurality of raised areas 131. The raised areas 131 are not limited to any specific shape or type, and number. Mounting holes 132 are provided on the lens 13 corresponding to the mounting holes 101 on the backboard 10.

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Fig. 4 is an assembled sectional view of the turn signal light 1 of the present invention.

Please refer to Fig. 5. Light beams emitted from the  
25 light-emitting diodes 111 are first reflected at the

inner wall surfaces of the openings 121 to intersect with one another. When the intermediate board 12 has reflecting outer surfaces, the reflection effect would be even better. The reflected light beams are then  
5 projected toward the inner side of the lens 13 and refracted by the raised areas 131 to shine in all directions.

The following are some advantages of the present  
10 invention:

1. The initially direct light beams emitted from the light-emitting diodes 111 enclosed in the openings 121 are reflected at the reflecting inner wall  
15 surfaces of the openings 121 to intersect with one another.
2. The openings 121 with reducing cross section and the protective walls 123 behind the intermediate board  
20 12 provide good protection to the light-emitting diodes 111, and the spaces between the protective walls 123 may still be fully utilized to accommodate electronic elements.
- 25 3. The raised areas 131 provided at the inner side of



the lens 13 provide good refraction effect for the  
light beams emitted from the light-emitting diodes  
111 to spread over an even wider range, enabling the  
turn signal light to be viewed by other drivers and  
5 pedestrians from widened viewing angles.

The present invention has been described with a  
preferred embodiment thereof and it is understood that  
many changes and modifications in the described  
10 embodiment can be carried out without departing from  
the scope and the spirit of the invention that is to  
be limited only by the appended claims.